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From the Editors

This issue of *The Victorian Naturalist* marks a major shift in the journal's editorial team. After almost 20 years of close involvement in the production of the journal, Anne Morton is retiring. The members of *The Vic Nat* team are pleased to express their heartfelt appreciation, and the gratitude of the FNCV to Anne for her enduring dedication and unflagging service.

Anne's connection to the journal began in 1997, when she joined the production team, to provide her expertise in desk top publishing. Her role, as well as the personnel of the team, has changed through time. In 2003 Anne became Executive Editor, with two relatively new additions to the editorial team in Maria Gibson and Gary Presland, and Virgil Hubregtse in the pivotal role of editorial assistant. This team has remained unchanged for the past 13 years, in itself no small testament to Anne's guidance and inspiring leadership over that period.

In the 133 years of its print run only FGA Barnard—with a 32-year tenure—has had a longer connection with producing this journal than Anne. But the measure of worth here is quality not quantity, and in this regard Anne is without peer. Her extensive familiarity with graphic design and publishing software, coupled with her close attention to detail, has ensured that *The Victorian Naturalist* achieved and maintained a consistently high level in both content and layout. Her fostering of these qualities in her fellow editors will stand also as a legacy of Anne's long involvement with this journal.

We wish Anne all the very best in her future endeavours. Her presence, good humour and enthusiasm will be missed. The editorial team, with the recent addition of Sue Forster, will carry on, doing our best to maintain the high standard that Anne has set.

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Front cover: Newly fledged Spotted Pardalote *Pardalotus punctatus*. Photo Virgil Hubregtse.
Back cover: St Andrew's Cross spider *Argiope keyserlingii*. Photo Anne Morton.

Golden Sun Moth *Synemon plana* in urban reserves: two threats and mitigation measures

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Abstract

The Golden Sun moth *Synemon plana* is a diurnal moth listed as critically endangered in Australia. Many small reserves have been retained on Melbourne's outer north and western fringes to protect this species and its formerly extensive native grassland habitat. The moth exhibits synchronised emergence, presumably in part to achieve predator satiation. During population surveys for this species, staff from Merri Creek Management Committee observed two impacts relating to the urban context of two reserves: bird predation enhanced by an artificial density of perches and, misdirected breeding behaviour towards broken glass fragments resulting in futile breeding effort and greater vulnerability to predation. Mitigation measures to reduce these threats are identified and an observation on the application of one of these measures is reported. (*The Victorian Naturalist* 133 (6), 192–195)

Keywords: *Synemon plana*, urban context, predator satiation, threat mitigation, habitat fragmentation

Introduction

The Golden Sun Moth *Synemon plana* is a medium-sized diurnal moth that is critically endangered in Australia. This endangered status is a result of destruction of its grassland habitat and the limited dispersal ability implied by the low mobility of the females (Department of Environment, Water, Heritage and the Arts [DEWHA] 2009). Searches of proposed urban development sites revealed many unknown populations to the north and west of Melbourne since the moth's continued existence near Melbourne was confirmed in 2003 (Gilmore *et al.* 2008). Numerous small reserves have been retained within Melbourne's rapidly expanding suburbs to protect patches of remnant grassland that contain this species. During population monitoring of Golden Sun Moths between 2013 and 2015, we observed two threats to this species associated with reserve infrastructure and urban context. An action to mitigate one of these threats was attempted in 2015. Although the threats warrant further investigation, as part of a precautionary approach, the low-cost mitigation measures described here could readily be attempted at any small reserves facing similar threats.

Fences enhance pressure by perch and sally predators

Merri Creek Management Committee (MCMC) has conducted annual population surveys for Golden Sun Moths at the 1.8 ha Amberfield Grassland Reserve in Craigieburn since 2010.

During the four Golden Sun Moth emergence events observed at the Reserve in 2014 and 2015, Willie Wagtails *Rhiphidura leucophrys* were seen hunting in areas of the grassland where Golden Sun Moths were most commonly sighted. Willie Wagtails were observed flying from an internal farm-style fence in the reserve to attack prey and then returning to the fence. This behaviour is defined as a 'sally' (Remsen Jnr and Robinson 1990). The internal fence delineates a part of the reserve where visitors are at risk of being struck by golf balls straying from the adjoining golf course.

On 18 November 2015, three Willie Wagtails were frequently observed using this fence during a hunting period extending over half an hour. Numerous sallies were observed and two Golden Sun Moths were taken within approximately 20 m of the fence. This was half of the moths observed in the Reserve on this day and potentially a high proportion of the total population at this very small reserve. Willie Wagtails were also observed using perimeter fences and other structures around the reserve as perches for hunting. However the alignment of the internal fence allows Willie Wagtails and other predators to employ sally hunting in parts of the Reserve where Golden Sun Moths are most active. Using twenty metres as the distance for most effective hunting sallies, a map was created showing the sections of the Reserve at risk from predators using the sally manoeuvre (Fig. 1).

Fig. 1. Amberfield Grassland Reserve showing twenty metre buffers from perimeter (light shading), internal fence (horizontal hatching) and overlap (dark shading), with locations of Golden Sun Moth observations in 2015 (open circles).

Fig. 2. Internal fence with bird-scarer tape installed.

The existence of the internal fence reduces the area of the 1.8 ha reserve greater than 20 m distant from a perch, from 0.72 ha to 0.46 ha. The area of the Reserve at risk from sally predation has been increased from 60% to 74%. However, the impact is greater because the fence is located in the drier areas of the reserve, where biomass reduction has taken place, which are favoured by the Golden Sun Moths. Of the 13 locations where moths were observed in 2015, 10 were within 20 m of this fence including six in parts that would otherwise not be within 20 m of a structure. Only two moths were observed in the 26% of the grassland that remains more than 20 m distance from any fencing.

Our concern about the high predation pressure that the internal fence facilitates led us to recommend attaching a commercially available 'holographic flash' bird-scarer tape to the fence. This is a multi-colour coated, 25 mm wide polymer film that flashes in the sun, reflecting light with constantly changing colours and patterns. It also crackles as it moves in the wind. It is typically employed to reduce predation by birds on fruit crops. Installation of the tape was carried out by staff from Hume City Council in the week following 18 November. Lengths of tape up to a metre long were tied to the top wire of the fence at intervals of approximately 2 m (Fig. 2).

Following the tape installation, a survey occurred on 24 November during a Golden Sun Moth emergence. Incidental observation over half an hour detected two hunting Willie Wagtails with only one observed using the fence with tape installed. This individual used this fence for less than two minutes compared with near continuous use of the fence the previous week. Willie Wagtails continued to sally from neighbouring structures on the boundaries of the reserve but these efforts appeared less effective due to the greater distances from prey observation to reaching the target.

Broken glass stimulates futile breeding behaviour and increases exposure to predation

Merri Creek Management Committee conducts population monitoring of Golden Sun Moths at the 50 ha Cooper Street Grassland Nature Conservation Reserve in Campbellfield, managed by Parks Victoria.

On 24 November and 4 December 2015, MCMC staff observed very high numbers of

Golden Sun Moth males attracted to numerous patches of broken glass along one boundary of the Reserve where it adjoins a boulevard road and industrial estate. Up to 20 moths per minute were observed attempting to mate with shards of the glass that presumably resemble the metallic flash of females' hind-wings (Fig. 3). The glass originates from passers-by throwing bottles over the boundary fence. Subsequent slashing for access and fire protection smashed the bottles resulting in a large number of fragments within 10 m of the fence. The same behaviour was also observed elsewhere in the Reserve, with male moths landing on glass fragments left over from previous rubbish dumping. On each survey date, over one hundred moths were observed exhibiting this behaviour. This is a high figure compared to the male moths recorded during transect surveys of the total reserve on these dates (1177 on 24 November and 268 on 4 December). The misdirected mating behaviour presumably leads to reduced opportunity for successful mating during the brief synchronised emergence of the moths. It also leads to the males spending extended periods in areas of the Reserve where they are vulnerable to predators using adjacent fences as perches from which to hunt. We conjecture that this reduces the reproductive success of this population.

A clean-up of the broken glass is proposed as a means of preventing the immediate threat to future Golden Sun Moth emergences. Direction to inspect and clear bottles prior to annual slashing should be included in contract prescriptions. Community engagement to reduce casual littering might also be pursued. Volunteer and free labour could be sought to assist with the simple but labour intensive initial clean-up of the broken glass.

Fig. 3. Male Golden Sun Moth exhibiting mating behavior stimulated by reflection from broken glass.

Discussion

The original structure of native grassland habitat of Golden Sun Moths north of Melbourne is characterised by a low density of perches. In the absence of perches, aerial predators must rely on flight-based 'pursuit' foraging manoeuvres to capture Golden Sun Moths. Fences and other artificial structures increase the density of perches that species such as the Willie Wagtail can use to employ what are presumably less energy intensive sallying manoeuvres. We have observed introduced birds, including House Sparrows *Passer domesticus* and Common Starlings *Sturnus vulgaris*, apparently using perimeter structures to scrutinise their surroundings for Golden Sun Moth at Amberfield Grassland Reserve.

The potential impact of high predation pressure on small populations is identified in the Draft NSW and National Recovery Plan (Department of Environment and Conservation 2006) although the contribution of increased perch provision to this threat is not identified. Perimeter to area ratios mean that Golden Sun Moth populations in small reserves will be disproportionately impacted by processes associated with perimeters compared to those in larger reserves.

It is possible this enhanced hunting will have marginal impact on the Golden Sun Moth, whose synchronised emergence appears to have evolved, at least partly, to achieve 'predator satiation' or 'predator swamping' (Ims 1990; Sweeney and Vannote 1983). However, it is also possible that the impacts described here tip the balance too far in favour of the predators, especially in years where populations are low, or in small reserves where predator satiation is not possible.

A structured study of the impact of perch provision and broken glass on Golden Sun Moth populations may be possible given the large number of small reserves of different sizes and infrastructural layout that contain Golden

Sun Moth. Ideally such an investigation would identify reserve design, maintenance guidelines and community engagement programs to address these issues. Pending such a study, the application of bird-scarer tape and the annual inspection and clean-up of glass may be readily applied at existing reserves where these impacts are observed.

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Some observations of a Bird-dropping spider *Celaenia excavata* at Notting Hill, Victoria

Introduction: the sighting
On 29 March 2015, while hanging some washing on the line under laserlite roofing at the back of our house in the Melbourne suburb of Notting Hill, I noticed a bird-dropping-like lump, about 12 mm across, on one of the wooden clothes pegs. I knew it could not be a real bird-dropping, because the location was inaccessible to the rear end of any bird that could produce a dropping that size. While investigating, I saw the lump move: it was a female Bird-dropping spider *Celaenia excavata* (formerly *C. kinbergi*) (Fig. 1).

Fig. 1. *Celaenia excavata* on wooden clothes peg.

Characteristics of *Celaenia excavata*
Celaenia excavata is also known by the names Bird Dung spider (see Brisbane Insects website), Orchard spider because it is often seen in orchards, and Death's head spider because of its supposed resemblance to a skull (McKeown 1952; Australian Museum web site). It is widely distributed in eastern Australia (Museum Victoria 2006), and is also found in south-western Australia (Simon-Brunet 1994; Esperance Blog 2008). The male, being less than 3 mm long, is very rarely seen, but was described fully by Dunn and Dunn (1946).

For their camouflage alone, *C. excavata* and other species of bird-dropping spiders are quite amazing creatures, indistinguishable from bird droppings while they remain motionless during the day. But there are still more strange facts: *C. excavata* feeds almost exclusively on

male moths, which it attracts at night by exuding a scent resembling the sex pheromones of a female moth (Museum Victoria 2006); it has a preference for a particular species of moth (Simon-Brunet 1994), the type of moth varying from place to place and also with availability; and there has been a suggestion that it resembles a moth as it hangs, with legs outspread, on its thread of spider silk, waiting for an unsuspecting male moth to arrive (Esperance blog 2008). Furthermore, there is evidence that when the supply of preferred moths runs out, the spider can change its pheromones to attract other types of moth (Museum Victoria Discovery Centre, pers. comm. 23 June 2015).

Celaenia excavata at Notting Hill

About 20 years had elapsed since I last saw one of these spiders, along with its spherical brown egg sacs, in our garden, and until this moment I had seen it only on foliage, which is its usual habitat (Simon-Brunet 1994; Australian Museum website; Museum Victoria website; Museum Victoria 2006). There was plenty of foliage on the shrubs *Acca sellowiana* and *Banksia spinulosa* a mere two metres away, but this spider did not use it during its six-month stay.

Instead, it rested on the pegs (Figs. 1 and 2), the beams and the metal-covered fascia board. From 30 March to 4 April, the spider gradually moved from the pegs to one of the beams, then to the beam nearest the eaves. On the morning of 5 April it was on the fascia board, where it stayed until 26 September. With few exceptions, it remained stationary during daylight hours, hanging below its resting place only during darkness. On most nights it hung about 30 mm below the board; on others it hung lower down, dangling by threads of spider silk joined to the fascia board (Fig. 3). However, on August 14 and 15, in broad daylight, it hung on threads joined to the fascia board and to a beam, up to 200 mm below its usual resting place (Fig. 4). I do not know what prompted this brief change in behaviour.

Hunting and feeding behaviour

During its stay on the fascia board, the spider caught no fewer than three moths. I was away from 13 to 23 April, so I do not know if the spider captured any prey during my ab-

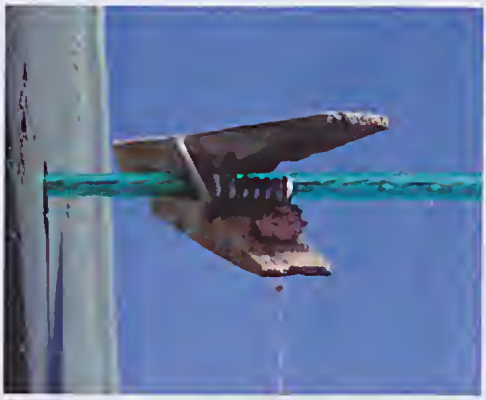

Fig. 2. *Celaenia excavata* in shaded part of wooden clothes peg.

Fig. 3. *Celaenia excavata* hanging below its resting place.

Fig. 4. *Celaenia excavata* hanging well below its resting place, in broad daylight.

sence. When I returned, the spider was in its usual resting place on the fascia board. On the morning of 27 April I saw the spider clasping a male moth (Fig. 5), no doubt caught the previous night (McKeown 1952; Museum Victoria 2006). I saw it drop the moth at 2 pm that day. The moth carcase blew away while I was taking some photos of the now sated spider (Fig. 6), and I didn't manage to relocate it.

I next saw the spider feeding from a male moth on 14 June. The moth was the same sort as the one caught in April. This time I managed to collect the carcase by putting a cardboard box underneath the spider's resting place. (How I wish I had done this previously, especially just before I went away!) I sent the carcase to the Discovery Centre at Museum Victoria, where it was identified as belonging to the *Chlenias banksiaria* group (family Geometridae).

It was not until 11 September, more than twelve weeks later, that the spider caught another moth. I saw it with the moth at about 9.30 pm (Fig. 7). This moth, also a male, was much smaller than the other two. Again I collected the carcase in a cardboard box, and sent it to Museum Victoria, where it was identified as belonging to the family Pyralidae, subfamily Phycitinae.

Fig. 5. *Celaenia excavata* with a male moth.

Fig. 6. The sated spider.

Fig. 7. *Celaenia excavata* with a small male moth.

Disappearance

On 26 September the spider was on the fascia board at 7.30 am, but had disappeared by 9.20 am, the torn spider silk (Fig. 8) indicating that the creature had been ripped away by a predator. I don't know what the circumstances were, but I suspect a wattlebird took it, because both Red and Little Wattlebirds were feeding young at the time, and were frequently searching the eaves and fascia boards for food.

Discussion

Choice of location

Although the websites of the Australian Museum and Museum Victoria, as well as books about spiders, such as McKeown (1952) and Simon-Brunet (1994), say that the habitat of *C. excavata* is foliage, there is anecdotal evidence of this spider being found in man-made habitats. Comments on the website Esperance Blog (2008) indicate that it has been seen on a wash-

Fig. 8. Torn silk where the spider has been taken from its resting place.

ing line and on a rubbish bin; and a comment on the website Hunter Valley Backyard Nature (2008) mentions one on a garage door frame. Therefore it may not be particularly unusual for one of these spiders to take up residence on a metal-covered fascia board.

The fascia board where the spider stayed is situated just above our bathroom window. When the bathroom light is on, moths are attracted to the window, a circumstance that could have enhanced the spider's chances of procuring prey.

The resting place

McKeown (1952: 110) quotes WJ Rainbow's observation of *C. excavata*:

> ... a little loose silk is spun over a portion of the surface of a leaf, in the centre of which the spider lives,

and notes that of the possibly thousands of individuals he has observed, he has never seen this species with a white sheet of web beneath it on the surface of the leaf. The spider at Notting Hill rested in the centre of a doughnut-shaped silk mat that it spun on the fascia board (Fig. 8).

Hunting behaviour

Some descriptions of this spider give the impression that it always hangs on a short single thread of spider silk while waiting for prey (e.g. Australian Museum 2014). The spider at Notting Hill usually clung to at least two threads (Figs. 3, 4, 9) that were each anchored to different places. On one occasion I found it on a short thread attached to two longer threads (Fig. 10).

Fig. 9. *Celaenia excavata* on two threads.

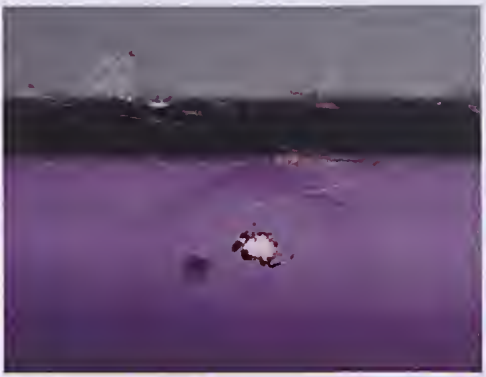

Fig. 10. *Celaenia excavata* on a short thread attached to two longer threads.

Alleged resemblance to a moth

I didn't think it looked at all like a moth!

Feeding behaviour

My observations agree with other descriptions of this species (e.g. McKeown 1952) in that feeding was very infrequent and only male moths were caught. Females of the spider's favourite moth were seen in the vicinity. After more than 12 weeks the spider apparently changed its pheromones to catch a different species of moth when its favourite was no longer available.

Movement in daylight

This was seen only on 29 March and 14 and 15 August. On 29 March the spider may have moved because it preferred shadow to sunlight —the following day I found it on the underside of a wooden peg (Fig. 2). I have no explanation for the movements in August.

Conclusion

I regretted the spider's disappearance, since I had hoped to see the creature prosper and eventually produce egg sacs. The number and variety of spiders and insects in this suburb seems to be continually decreasing, maybe because of drier weather conditions.

Acknowledgements

Thank you to the Discovery Centre staff at Museum Victoria for identifying the moths and supplying additional information.

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Fireblight affecting wattle trees

In September 2015, I observed partial defoliation of many Black Wattle *Acacia mearnsii* along the Blacks Walk and Kalang Park sections of the Blackburn Creeklands. It was clear that this had been caused by an outbreak of the larvae of the native Fireblight Beetle *Acacicola* (or *Peltoschema?*) *orphana* (family Chrysomelidae), as many larvae (Fig. 1) were seen on affected branchlets.

Well known in south-eastern Australia, including Tasmania, the Fireblight Beetle is widespread, probably wherever Black Wattle and Silver Wattle occur naturally. In some years, the Fireblight Beetle builds up populations and eats most of the wattle leaflets, just leaving the midrib. Affected trees look brownish (Fig. 2), as though they have been scorched by fire — thus the common name. They look almost dead, but scratching the bark of a leafless branchlet will show green (live) tissue.

Most affected trees along the Blackburn Creeklands were relatively young, being less than about 10 cm in diameter and less than 5 m tall. The majority of larger Black Wattles appeared unaffected.

Fireblight larvae damage was not confined to this area in Blackburn, as (on 29 October 2015) it was also noticed on Black Wattles growing alongside the Calder Freeway in the Macedon area and further north near the Elphinstone turn-off. As well, on 11 October 2015, defoliation was noted along the road to Steavenson Falls, near Marysville, but here the wattle species was Silver Wattle *Acacia dealbata* ssp. *dealbata*, growing densely after the 2009 bushfires. Silver Wattle is commonly attacked in Tasmania (Elliott 1978, Elliott *et al.* 1998, Forestry Tasmania 1999), but, interestingly, the Silver Wattle in the Blackburn Creeklands was unaffected during September and October 2015.

Later checks of the extent of fireblight defoliation east of Melbourne, in mid-November 2015, showed severely affected Black Wattle near the corner of the Heidelberg–Warrandyte

Fig. 1. Fireblight beetle larva from Black Wattle, Blackburn Creeklands, October 2015.

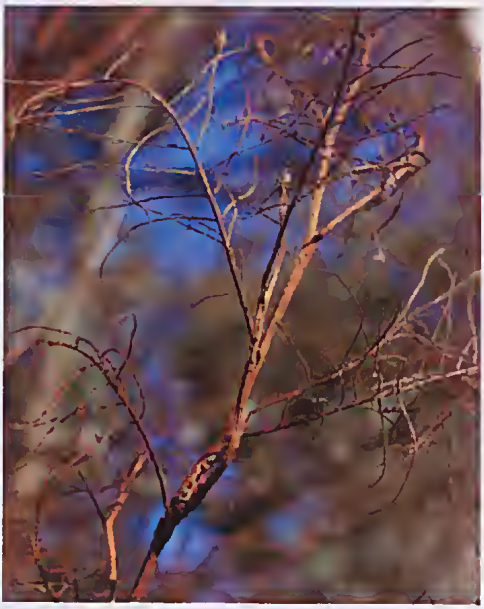

Fig. 2. Black Wattle tree affected by Fireblight Beetle larvae, October 2015.

Road and Harris Gully Road, Warrandyte (Fig. 3). However, no damage was seen to Black Wattles in The 100 Acres Flora and Fauna Reserve, Park Orchards or in Jumping Creek Reserve, Warrandyte State Park. In addition, Silver Wattles alongside the Yarra River at Warrandyte showed no evidence of damage.

The following lifecycle information of the Fireblight Beetle is based on Elliott *et al.* (1998), but Simmul (2001) might give more detailed information. The adult beetles are about 6 mm long and are creamy with green and brown stripes. After feeding on their wattle host for about a month, they lay eggs in autumn, in rows on the underside of leaves. The eggs hatch out after approximately two weeks. During winter, the young greenish larvae consume the foliage. In late spring, the mature (10 mm long) larvae drop to the ground and burrow into the soil and pupate. The adult beetles emerge from the soil after four to five weeks in late spring to early summer, and also feed (lightly) on the wattle foliage, before laying the next generation of eggs in autumn, thus completing the lifecycle.

Follow-up observation of the Blackburn Creeklands Black Wattles affected in spring showed that by January 2016 most had sprouted new foliage (Fig. 4). Elliott *et al.* (1998) state that most trees recover but repeated attacks will weaken some trees, and may lead to dieback and death. A report of severe defoliation

Fig. 3. Defoliated Black Wattles at Warrandyte, November 2015.

Fig. 4. Fresh shoot growth of Black Wattle, Blackburn Creeklands, January 2016.

by fireblight larvae, dated 25 September 2012, was posted on the Traralgon South and District Environment website (TSDE 2012). This described damage on both Silver Wattle and Black Wattle regrowth occurring after the 2009 bushfires in the Won Wron State Forest (near Yarram). However, only six months later, it was reported that the trees 'have staged a dramatic comeback'.

As most reports of defoliation and dieback refer to younger trees, it can be conjectured that either foliage of older trees is not so palatable or that the larvae are 'afraid of heights' in that they can only safely fall or traverse a limited distance from the branches to the soil when the time comes to pupate.

Given that obvious damage does not occur every year, what are the factors that lead to a 'defoliation outbreak'? Factors which regulate insect defoliator populations are complex and include weather conditions, extent of predation, nutritional quality of the host foliage, tree factors (age, structure and density), understorey type and depth of the litter layer (Elliott *et al.* 1998). Specific site factors appear to have a strong influence on the extent of wattle defoliation by the Fireblight Beetle, given that my observations (albeit limited) showed considerable location variability in defoliation of both Black and Silver Wattle stands.

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Notes on a naturalised population of the Eastern Dwarf Tree Frog *Litoria fallax* (Peters) (Anura: Hylidae) in north-east Victoria

The Eastern Dwarf Tree Frog *Litoria fallax* (Peters) (Anura: Hylidae) is a small (25 mm snout-vent length) frog native to coastal and adjacent areas from central-eastern Queensland to southern NSW (Tyler and Knight 2011). It inhabits vegetation, particularly reeds and floating plants, in and beside small creeks, dams, lagoons and swamps (Cogger 2014). Its preference for sheltering in the leaf-axils of pandanus, banana and pineapple plants, often well away from water (Cogger 2014) and within urbanised environments (Hodgkison *et al.* 2007), means this species is frequently transported, along with horticultural products and fresh fruit, to cities and towns outside its known natural range (Gillespie and Clemann 2000). For example, *L. fallax* has been transported to Guam in the tropical western Pacific Ocean where it has established a breeding population (Christy *et al.* 2007). In Australia, it was recorded in 1999 outside its natural range from a sand quarry in Moorabbin, Melbourne (Gillespie and Clemann 2000). It has since been recorded in other Melbourne suburbs including Manningham East, Heidelberg, Kew and Melton, where, in some areas, it has established breeding populations (ALA 2015). Its persistence in Melbourne is believed to be facilitated by the 'heat island' effect, where minimum winter temperatures are higher than those of surrounding rural areas (Hamer and McDonnell 2010), thus providing a suitable breeding environment.

In this note, we report on a population of *L. fallax* that has become established in north-east Victoria near the townships of Baranduda, Kiewa and Osbornes Flat. On 30 November 2010, a small green male hylid frog was captured by one of the authors (GJ) in a garden near the township of Baranduda. It was identified as *L. fallax* and was subsequently removed from the wild as it was presumed to have been accidentally introduced from northern Australia. In February 2012, GJ made a second observation, when approximately five males were recorded calling from vegetation along the bank of Yackandandah Creek, near the Kiewa Bridge crossing (36°13'18.63" S, 146°59'07.4" E; 176 m ASL). Yackandandah Creek is a semi-permanent riparian system with headwaters in Stanley State Forest. The vegetation at this section of the creek includes River Red Gum *Eucalyptus camuldulensis*, exotic Weeping Willow *Salix babylonica* and Phragmites *Phragmites australis*.

On 5 March 2012, during a survey of nocturnal fauna, DM recorded three male *L. fallax* calling from a small dam (6 m in diameter) on a rural property located on Lindsay Road, 1.6 km from the Yackandandah Creek population (36° 14' 09.13" S, 146° 59' 06.97" E; 25 m ASL). All three male frogs were observed calling from eucalypt saplings emerging from the water. The vegetation fringing the dam included a mixture of exotic and annual grass, including Paspalum *Paspalum dilatum*, Phalaris *Phalaris aquatica* and Red Leg Grass *Bothriochloa macra*. Other frog species calling near the dam included Peron's Tree Frog *Litoria peronii*, Common Froglet *Crinia signifera*, Eastern Sign-bearing Froglet *C. parinsignifera*, Banjo Frog *Limnodynastes dumerilii*, Spotted Marsh Frog *L. tasmaniensis* and Smooth Toadlet *Uperoleia laevigata*. During a repeat survey of the Lindsay Road property in March 2013, five *L. fallax* were recorded at the same dam, another male was recorded near the property entrance and a chorus of *L. fallax* was heard calling from a series of small dams on a neighbouring property (36°14'0.20" S, 146° 58' 48.93" E; 203 m ASL). DM revisited Yackandandah Creek later on the same evening, where a loud chorus of *L. fallax* was recorded along a 1 km section of the creek, including adjacent wetlands and farm dams.

Since these observations, further sightings of the species (all verified by DM from photographs) have been reported, including sporadic sightings since 2012 from an urban garden in Kiewa (G Luck pers. comm. 16 March 2012), regular sightings since March 2011 from a rural property in Allan's Flat (J Tomkins pers. comm. 2 May 2016), and regular sightings since 2005 from an urban garden in Osbornes Flat (C Reid

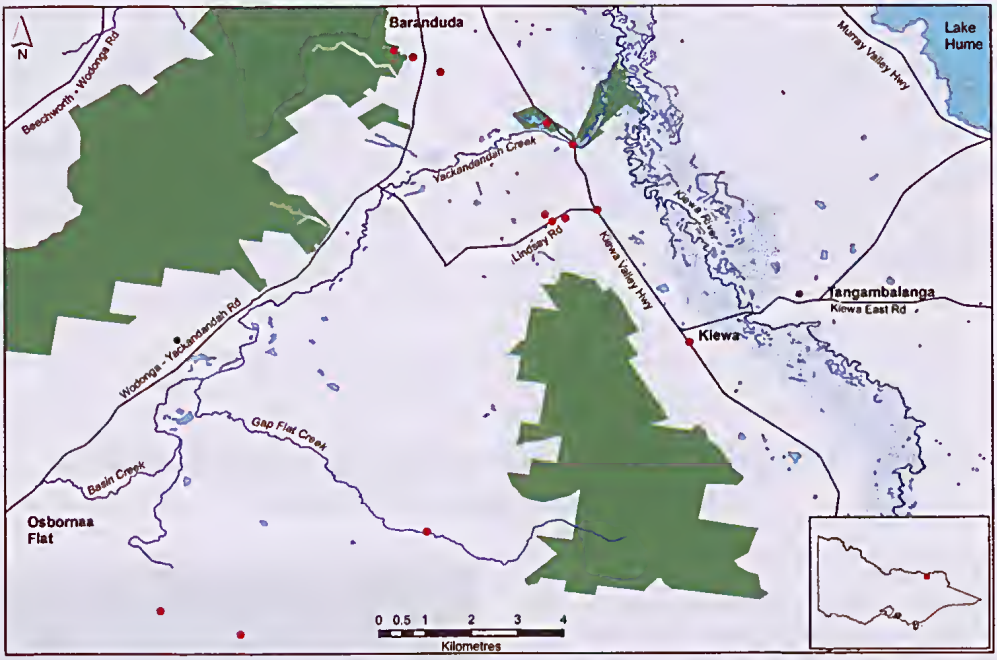

Fig. 1. Location of Eastern Dwarf Tree Frog *Litoria fallax* sightings (red dots) in north-east Victoria.

pers. comm. 22 December 2015). Several unconfirmed sightings of *L. fallax* have also been reported from the townships of Yackandandah and Leneva. The observations reported in this note suggest that *L. fallax* is well established in this area of north-east Victoria (Fig. 1), a region which experiences frequent subzero temperatures during the winter months and has, on average, lower mean winter temperatures than those of the suburbs of Melbourne. The mean monthly minimum temperatures for Wodonga (the closest town to Kiewa) between May and August are: 4.3°C, 4.3°C, 2.6°C and 3.4°C, cf. Moorabbin Airport, Melbourne: 8.6°C, 6.7°C, 6.1°C and 6.9°C (BOM 2015). A small population (approximately five males) has also been recorded near Talbingo Dam near Tumut (D Hunter pers. comm. March 2012), providing further evidence of this species' ability to survive in temperate climates.

The implications of this invasion for the local frog fauna in north-east Victoria are unknown. However, Gillespie and Clemann (2000) suggest that alien frog species have the potential to compete with, or prey upon, local frog species at the larval or adult stage. Furthermore, alien frogs have the potential to spread disease and harmful pathogens such as *Batrachochytrium dendrobatidis*, a parasitic chytrid fungus which has been detected on *L. fallax* (Kriger and Hero 2007), and may have conservation implications for two threatened frog species in the region—the Southern Bell Frog *L. raniformis* (Mitta Mitta valley population <30 km to the east) (ALA 2015) and the Booroolong Frog *L. booroolongensis* (Mount Lawson State Park population <100 km to the north-east), (ALA 2015). We recommend further research to evaluate the ecological and biological impacts of *L. fallax* on local frog species in north-east Victoria.

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Spotted Pardalote *Pardalotus punctatus* breeding behaviour at Notting Hill, Victoria, 2003–2015

Introduction

Spotted Pardalotes *Pardalotus punctatus* have nested or attempted to nest in our garden, in the Melbourne suburb of Notting Hill, on four occasions: once in 2003, once in 2011, and twice in 2015. Two broods produced in 2015 were the only ones that fledged.

2003

In mid-July a pair of Spotted Pardalotes started to dig a tunnel in a rockery embankment near the back door of our house. By 9 August they were carrying nest material into the tunnel. They were seen mating on 14 August, but by 27 August they had gone. A dwarf *Banksia spinulosa* overhangs the rockery, and was in flower at the time. Little Wattlebirds *Anthochaera chrysoptera* appeared to lay claim to this shrub, and were very aggressive in defending it from any perceived threat. They kept chasing the pardalotes, possibly causing them to abandon the nest site.

2011

From mid-July to early August, a pair of Spotted Pardalotes dug their nest tunnel in a clay bank in our garden. On 9 August they were seen carrying nest material into the tunnel. From 19 August to 8 September the birds seemed to be absent—the strategy these birds use when brooding their eggs. The young hatched about 9 September, but unfortunately the adults were killed by a domestic cat *Felis catus* on 16 September when the nestlings were only one week old (Hubregtse 2011). According to Higgins and Peter (2002: 35), Spotted Pardalotes are often killed by cats.

Fig. 1. Plastic netting in front of the nest site.

2015

First nesting

On 24 August a pair of Spotted Pardalotes was observed digging a nest tunnel in the rockery embankment near our back door. By 30 August these birds were collecting nest material from an area of garden near our back fence. This behaviour continued for about one week. On 8 September at 8.20 am the pardalotes were seen mating. I didn't see them much until 18 September, when they were perching near the nest

site. By 22 September they seemed to be absent, but actually had started brooding their eggs.

On 12 October a faint squeaking sound was coming from the rockery, indicating that young pardalotes had hatched and were being fed (they called only when an adult arrived with food). There didn't seem to be much activity at the site, however, because the adult birds kept very quiet and approached the nest under a continuous cover of foliage of a plum tree *Prunus* sp., a tall *Acca sellowiana* shrub and the dwarf *Banksia*.

By 15 October the voices of the youngsters had increased in volume. I hoped fervently that no cat would hear them. I took some comfort from that fact that I hadn't seen any cats in our garden for several months, but I hadn't realised that an avian predator with a family to feed was on the scene.

On 21 October there was a huge commotion in the garden, with Common Blackbirds *Turdus merula*, Common Mynas *Sturnus tristis*, Red Wattlebirds *Anthochaera carunculata*, Little Wattlebirds, Brown Thornbills *Acanthiza pusilla* and White-browed Scrubwrens *Sericornis frontalis* all shouting alarm calls. I went to see what was happening, and was just in time to see a Little Raven *Corvus mellori* standing at the nest tunnel entrance with a young pardalote in its bill. The raven flew away as soon as it saw me. I expected that it or its mate would come back for the remaining nestlings, so my husband, Jurrie, put some plastic netting in front of the nest site (Fig. 1) in hope of deterring the unwelcome visitor. Although the netting would not have prevented the ravens from approaching the nest entrance, they did not seem to want to go near it. Instead, they took nestlings from other birds' nests (especially those of Common Blackbirds), and successfully raised one fledgling.

On 28 October the young pardalotes fledged. We think there were three, but it was a bit difficult to tell because they moved around so quickly in the foliage. Their call was a quite loud single whistle. After a couple of hours the whole family flew away, and we didn't see the young ones again, although the adults sometimes came to our birdbath for a drink.

Second nesting

On 8 November the pardalotes were seen carrying nest material into their tunnel, presumably refurbishing in preparation for another brood. Higgins and Peter (2002: 44) state that the fledglings are 'probably independent within 8 days'. On 13 November at about 4 pm the pardalotes were seen mating.

No further activity was evident until 7 December, when we assumed that the young birds hatched. By 15 December we could easily hear the youngsters squeaking in the nest, and by 18 December they were calling quite loudly. On 29 December, between 10.30 and 11 am, they fledged, and I managed to photograph one on the plastic netting (see front cover). The first to leave emerged about 25 minutes before the last one. The last one was very reluctant to leave, and after a while one of the parents came back for it. I think there were four fledglings, but again it was difficult to be certain.

Once the pardalotes had departed I photographed the tunnel entrance (Fig. 2), which was 330 mm above ground level. Jurrie checked the length of the nest tunnel, and it measured 220 mm to the nest. The nest would have been about 90 mm in length and the original tunnel about 310 mm long, compared with 300 mm for the tunnel made in the clay bank in 2011.

Fig. 2. The nest tunnel entrance.

Unusual behaviour

During the second nesting period in 2015 I was 'buzzed' three times by the same adult pardalote. Each time the bird was on its way to collect food for its young. The first time, the bird flew in a loop around me while I was filling a birdbath about 5 m from the nest. The second time, the bird flew very close to me when I was approaching the back steps, about 4 m from the nest. The third time, I was near our back fence, some 20 m from the nest. The bird flew very close to my head—much lower than it would normally be flying by the time it reached the fence (it always flew in the same direction, while its mate flew in a different direction). Why? Aggression? Curiosity? This didn't happen during the first nesting, when we assisted the pardalotes by putting netting in front of the nest to deter the Little Ravens. We also helped by providing water at all times, but of course it was not possible to tell whether the pardalotes saw our activities as helpful. However, I doubt that it was a display of aggression, because at no stage since the pardalotes started digging back in August had they shown any sign of aggression towards us. In fact, there were several occasions when I was scarcely a metre from them (including one occasion when they were mating), and they showed no sign of being disturbed by my presence.

Comparison of Spotted Pardalote pairs

While the general pattern of behaviour in Spotted Pardalotes is much the same, it is clear that there are some variations. The 2011 pair was very shy of humans, while the other two pairs were not. Unlike the male of the 2011 pair, the 2015 male did not call from nearby trees after the young hatched. The 2015 pardalotes were much quieter and more secretive than the 2003 and 2011 pairs. Maybe they had had the opportunity to become more experienced, knowing that it was best to nest undetected. This strategy worked well until the Little Ravens noticed, and the nesting may not have been successful without some human intervention.

Conclusion

It is not known if any of the 2015 fledglings survived for very long. We saw none of the first brood after they left the nest. Two of the second brood were in our garden on 13 and 17 January 2016, and one on 18 January. Little Ravens, Grey Butcherbirds *Cracticus torquatus* and Pied Currawongs *Strepera graculina*—all known to kill small birds—were in the vicinity, and Noisy Miners *Manorina melanocephala* abound in this area, aggressively driving other birds away.

The adult pardalotes continued to visit our garden until mid-September 2016. They inspected the nest site during August and September but did not re-use it, possibly because wet weather during winter and spring had made it uninhabitable..

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Unusual refugium for a juvenile Eastern Brown Snake *Pseudonaja textilis*

Eastern Brown Snake *Pseudonaja textilis* (Serpentes: Elapidae) is a large diurnal terrestrial snake widely distributed in eastern mainland Australia, with an isolated population in the Northern Territory (Cogger 2014). In native habitats it typically occupies cavities beneath rocks and in fallen logs, in some areas deep cracks in dry soil, but readily exploits discarded anthropogenic materials, such as building debris, as refugia in rural and urban landscapes (pers. obs.).

The observations reported here occurred during the course of a casual zoological survey by a party that included the first author, at approximately 3 pm on 19 April 2009. The location was in a private, restricted area to the west of Nutt Road, Londonderry, at the outer north-western edge of the Greater Sydney metropolitan region, New South Wales, at 33.658°S, 150.716°E, 29 m. The ambient temperature was approximately 16°C; there was neither cloud cover nor wind.

On the cleared verge of a dirt walking track, a juvenile (total length ~30 cm) *P. textilis* was found in an unusual refugium: a large hollow bone of a cow (exotic *Bos taurus*). The bone was either a femur or a humerus, broken at one end, ~30 cm length, 6 cm external diameter and 2.5 cm internal diameter. It was situated ~40 cm from the verge of the track, with ~6 other scattered cow bones and scattered surface pebbles (derived from local Castlereagh Conglomerate).

As the bone was being lifted by one of the survey party, the snake—initially coiled within it—shot out of the broken end, when raised about 30 cm above the ground. Subsequently, it was very active, despite the low ambient temperature, and rapidly crawled away into leaf litter and low vegetation. Examination of the bone revealed an adult female Red-back spider *Latrodectus hasseltii* (Theridiidae) that had constructed a web within the hollow. Habitat in the vicinity comprised disturbed remnant and regrowth dry sclerophyll woodland (Castlereagh Woodland, a vegetation formation restricted to a relatively small area east of the Nepean River) dominated by *Eucalyptus sclerophylla* (Myrtaceae) with a diverse understorey of native shrubs and herbs, on yellowish brown clay-sand soils overlying Castlereagh Conglomerate parent materials, with profuse illegally dumped anthropogenic litter dispersed over the area.

It was unknown whether the bone was used as a long-term refugium by the juvenile *P. textilis*, or if it was sought as a temporary refuge by the active snake on the day, perhaps due to the presence of observers in the immediate area. The former alternative is most probable given the relatively low ambient temperatures at this time of year. *Pseudonaja textilis* readily uses anthropogenic materials as permanent and temporary refugia, and still occurs in low numbers in many urban fringe areas of the Greater Sydney metropolitan region (pers. obs.), athough infrequently observed by the general public. *Pseudonaja textilis* has not previously been reported as finding refugia inside bones, and cotenancy with the *L. hasseltii* and the situation of the refugium close to an apparently frequently used walking track were also of some interest. Large hollow bones are in some respects structurally analogous to fallen hollow limbs and sticks sometimes used as refugia by small herpetofauna. It is possible several small species of Australian reptiles and frogs could exploit hollows in large bones as refugia, but such occurrences are apparently hitherto unreported.

Acknowledgement
We thank Dean Hainsworth for field assistance.

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2016 Australian Natural History Medallion 2016
Dr Max Moulds

The 2016 Australian Natural History Medallion has been awarded to Dr Max Moulds for his contribution to the study of entomology. Max was nominated by the Entomological Society of Queensland.

Since childhood, Max Moulds has had an abiding interest for the world of insects. Like many other boys growing up in Sydney, he was keen on cicadas. This early interest developed into a long-standing passion in the superfamily Cicadoidea, on which he has become the acknowledged world authority.

Early in his entomological studies he realised the difficulties of obtaining suitable equipment for entomological study and field work. So in 1962, while employed as a primary school teacher in Glen Innes, he created Australian Entomological Supplies, a mail-order business he operated from his home. He maintained this business—which included designing and building most of the butterfly nets and other gear himself—until 1972, firstly in Glen Innes and then in Sydney from 1968. The business continues today.

Max founded the *Australian Entomological Magazine* in 1972, which he edited, printed and distributed for 16 years, also from his Sydney home. Having created a venue for amateur entomologists to publish the results of their studies, Max also published many articles and booklets that focused on techniques for collecting and preserving specimens, to further help his fellow non-professionals. In 1988, Max donated the entire operation to the Entomological Society of Queensland (ESQ), along with several thousand back issues. The journal was revamped and renamed *Australian Entomologist*, and has become the Society's flagship publication. Max has been a member of ESQ for more than 50 years and continues to publish regularly in the journal; he often acts as referee and always makes himself available to provide advice.

In pursuit of specimens, Max has travelled widely in Australia, undertaking field work into many remote parts of the tropics of Queensland, Northern Territory and Western Australia, as well as Papua New Guinea. For a decade beginning in the 1960s, he collected on Cape York Peninsula during the wet seasons, the first entomologist to do so. Among numerous discoveries he made during this period was the extraordinary antlered fruit fly named in his honour, *Phytalmia mouldsi* McAlpine, which Max first recorded in 1977.

Dr Max Moulds (R) with his Medallion, and presenter Dr Bill Birch AM, President of the Royal Society of Victoria, 7 November 2016. Photo Joan Broadberry.

Wherever Max undertook field work, he liaised closely with local amateur collectors and has done much to promote and encourage amateur entomology in Australia. He was

awarded the Zoo Le Souëf Memorial Medal by the Victorian Entomological Society in 1985 in recognition of his ongoing contribution to amateur entomology. In the lecture he delivered on the occasion of being presented with the Medal, titled 'Australian entomological research: the role of the amateur', Max spoke, fittingly, about the importance of a citizen-science contribution. Max could be said to represent everything that is commendable about the involvement of non-professionals in natural history.

After more than 30 years as an 'amateur' entomologist, Max took up his first professional position in the subject in 1990, as Collection Manager of the Australian Museum's insect collection, the largest of any such museum assemblage in Australia. In this role, Max undertook a major reorganisation of the collection; it also allowed him the opportunity to build on his extensive fieldwork on Australian cicadas with some serious research. He enrolled part-time at Macquarie University where, in 1995, he took a Master of Science. In 1999 he earned a PhD at Sydney University for his application of cutting-edge techniques of phylogenetic analysis and digital acoustics in cicada research.

Following his retirement in 2003 Max moved to the Kuranda rainforest in North Queensland, where he continues private research, particularly on hawk moths, another of his long held interests. In the last 10 years Max has described 30 new species, and over 40 new genera, of cicadas and hawk moths. Currently, he is putting the finishing touches to a fully illustrated colour volume revising the approximately 85 hawk moths of Australia, which will include full life histories from egg to pupa of nearly all species. This major volume will be published by CSIRO in its series of Lepidoptera Monographs.

Dr Moulds already has an enviable publication record. Between 1963 and the present day he has produced 84 formal publications, as sole or joint author; and the list is still being extended. This corpus includes two major volumes on his favourite areas, butterflies and cicadas. The first of these monographs, *Bibliography of the Australian butterflies (Lepidoptera: Hesperioidea and Papilionoidea) 1773-1973*, published in 1977, was a 239-page annotated bibliography of all Australian butterfly publications to date. The value this had in the field of Australian lepidopteran studies was significant, facilitating an increase in field studies in the following years. *Australian Cicadas*, published in 1990 and intended for a wide readership, won the prestigious Whitley Medal for best natural history book in Australia. His papers have focused on a wide range of subjects of relevance to entomologists, including butterflies, cicadas, hawk moths, and dragonflies, as well as the history of entomology, and techniques for collecting, preserving and storing specimens.

Max Moulds has been a major contributor in Australian entomology for almost sixty years, crossing boundaries between amateur and professional work in that field, while continually making knowledge of Australia's insect fauna accessible to the public. He is a worthy recipient of the Australian Natural History Medallion.

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Australian Natural History Medallion Trust Fund

Since February 2016 donations to the Trust Fund have been gratefully received from the following:

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John Poppins	18	Julia Davis	10
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Alan Reid	20	Juris Ozols	10

If you would like to contribute to this fund, which supports the Australian Natural History Medallion, donations should be sent to: The Treasurer, Field Naturalists Club of Victoria, PO Box 13, Blackburn, Victoria 3130. Cheques should be made payable to the 'Australian Natural History Medallion Trust Fund'.

The medallion is awarded annually to a person who is considered to have made the most significant contribution to the understanding of Australian natural history in the last ten years.

Gary Presland
Secretary, ANHM Committee

A World War I/ ANHM reflection

The FNCV Honour Board lists the names of those members of the Club who enlisted to serve during World War I. It was unveiled at the Club's AGM on 10 June 1918 by the Governor-General, Sir Ronald Munro Ferguson.

Happily, all of these men returned safely after the war, and some continued their interest in natural history for many years. It should be noted in that context that two of the members named here —CL Barrett and H Wilson—went on to be awarded the Australian Natural History Medallion (ANHM).

The ANHM was first awarded in 1940, and in 1943 the recipient was Herbert Wilson, in recognition of his contribution to natural history and education. Wilson was a former Director of Nature Study at the Teachers Training College.

A decade later, the Medallion for 1953 was awarded to Charles Barrett. A journalist by profession, he had become a well-known writer on the natural world. The award marked his contribution to ornithology and popularising natural history

Land of sweeping plains: Managing and restoring the native grasslands of south-eastern Australia

(Edited) Nicholas SG Williams, Adrian Marshall and John W Morgan

Publisher: *CSIRO Publishing, Clayton, Victoria, 2015. 472 pages, hardcover.*
ISBN 9781486300815. RRP $59.95

The title of this book borrows from the words of Dorothea Mackellar's poem My Country, which, to me, is quintessentially Australian. So a book such as *Land of sweeping plains*, which seeks to inform a wide audience about a typically Australian landscape similar to that providing the inspiration for this poem, is most welcome, especially as this landscape is our beautiful but threatened grasslands. The goal of *Land of sweeping plains* is to facilitate the enhancement, management and appreciation of our south-eastern grasslands, and it does this very well.

There are 14 chapters, which include historic, social, ecologic, faunal, restoration, planning and management perspectives. Following the Introduction, which sets out the purpose and import of the book, is an account of the social history of the grasslands. Beth Gott *et al.* explain the historic use of the grasslands by the Aboriginal people, the cultural value of the grasslands to the Aboriginal people today, and the changes that occurred to the grasslands with European settlement. Once 'yams' were widely collected from the grasslands. This term, we are told, is a general term referring to any tuber-forming plant such as the Morong-goni (potato), which probably was a species of *Arthropodium*, a lily. Only two-year-old plants were dug up and, from these, only the large new season's bulb removed. The old seed bulb or 'grandmother' and the small new season's bulbs known as 'grandchildren' were not removed but planted back into the soil. Originally, early settlers praised the grasslands for the extent of their deep rich soil and readiness for tilling, but by 1862 there were complaints that the hardening of soil due to grazing by sheep had radically altered the landscape. This chapter, as with the remaining chapters, is beautifully illustrated with many photographs depicting our grasslands today and in the past.

Chapters two and three describe the distribution of native temperate grasslands in south-eastern Australia, their floral composition, dynamics and environmental drivers of their ecology. Chapter 4 examines the wildlife of our grassy landscapes. There are lots of fascinating tales presented in this chapter for those who wish to understand more concerning the fauna. There is a photograph with an overlay of the sites visited day and night by a male kangaroo at Mount Taylor Nature Reserve during the millennium drought. It was not unusual for this kangaroo to explore deep into the suburbs in his nightly quest for food. There are reminders that when we clean up our environmental mess,

we need to be careful to do so appropriately. The Eastern Barred Bandicoot is believed to have used car bodies as shelter from introduced predators, and weeds similarly can provide benefits to some fauna. Thus, when we remove them we must do so gradually while providing an alternative habitat with native equivalents.

The book then proceeds to explore aspects of management and restoration of our grasslands. Understanding the social context of native grasslands, community involvement and integrating grassland conservation into farming is vital to long-term sustainable management of the grasslands so I was happy to see such chapters included. All topics presented within the various chapters are important, but one the urbanite may particularly wish to read is Chapter 13: Designing and planning for native grassland in urban areas. This shows the complexity involved in management of an urban grassland, which many do not understand.

> 'Access, engagement, education, displays of care, the role and design of the land adjacent to the grasslands, sustainability concepts, and even the ambition of creating biodiverse suburbs, are all important elements that can inform design that protects and promotes grassland. ... Good design can mediate the human experience of grassland in a way that promotes acceptance and builds positive relationships with the community. ... It encourages people to care for grassland, which in turn creates stewardship and protection into the future.'

I love my sunburnt country as Dorothea McKellar loved hers, and I am sure she would have appreciated this book, which seeks to ensure our grasslands survive into the future.

The book is well written and presented, and synthesises a voluminous amount of knowledge and literature in a way that is accessible to all interested in our grasslands, be they policy makers, on-ground environmental managers, farmers, students or any who simply wish to know more. I highly recommend this book to all.

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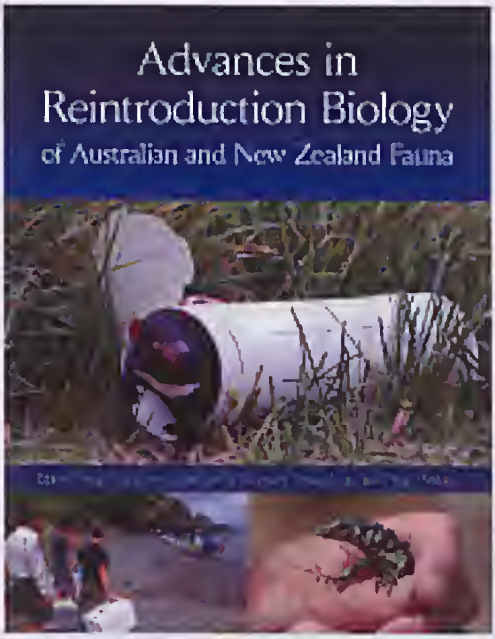
Advances in Reintroduction Biology of Australian and New Zealand Fauna

by (Eds) DP Armstrong, MW Hayward, D Moro and PJ Seddon

Publisher: *CSIRO Publishing, 2015. 320 pages, paperback, colour photographs.*
ISBN 9781486303014. RRP $89.95

Advances in Reintroduction Biology of Australian and New Zealand Fauna took my attention early on. Firstly, with the flattering suggestion that reintroduction biology is a relatively new field (my first publication, 21 years ago, was in this field); and secondly, because it proclaimed that the book *Reintroduction Biology of Australian and New Zealand Fauna*, edited by Melody Serena in 1995 (and where that first paper was published), was a watershed volume for the field.

This new book is organised according to specific themes, rather than individual case studies; a valuable advance in itself. The book has 20 chapters covering the latest advances in release strategies, disease risk, reintroduction policy and the roles of private and public zoos. Have things moved on in the field since 1995? In terms of moving on, no-one was talking about allozyme electrophoresis (look it up in an encyclopedia) in this new volume, nor were they talking about the importance of conserving spatial genetic structure. Allopatric divergence leads ultimately to evolution of new species, so that—I argued in 1995—reintroductions should be careful not to mix animals from different evolutionary lineages because mixing could undermine evolutionary processes. In chapter 10 of this new book, Andrew Weeks



and coauthors walk readers through the basics of the genetics of small populations. They emphasise that genetic diversity is lost when populations are small and isolated, so reintroductions should include individuals from multiple sources in order to boost the population's adaptive capacity. This genetic mixing can overcome inbreeding depression, and they cite the successful Mountain Pygmy Possum wild-to-wild translocation as a case in point. Perhaps in most cases of translocations, conserving spatial genetic structure will be irrelevant, either because there is no strong genetic structuring, or because the species is at risk of extinction without emergency translocation action. Perhaps conserving spatial genetic structure is a luxury we can no longer afford because, to get species through this period of peak-human, species are going to need to be able to draw on all of the adaptive potential we can provide them with, by mixing animals from different sources.

In summing up the book, Dorian Moro and coauthors identify emerging themes. Some of these, such as approaches to prey naivety, were emerging in 1995 too. The authors highlight the concerning trend towards salvage translocations, where threatened species are rushed out of their habitat as the bulldozers move in. On a more positive note, they also emphasise the new role that privately funded sanctuaries now have in translocations, and the importance of managing these separate areas as 'metapopulations', much like established zoos manage animal exchanges, to avoid inbreeding. In the near future, they see ambitious projects such as predator-free New Zealand and predator-free Tasmania as realistic goals for reintroduction biologists to work towards.

As the human population careers towards 9+ billion, consumption increases, and global trade accelerates, we can expect human appropriation of wildlife habitat to increase, new threats from invasive species, and a wacky changing climate that makes it hard to know where wildlife should be translocated to or from. In this climate of growing threats to biodiversity, we need *Advances in Reintroduction Biology*. It will be a valuable guide to reintroduction now, and hopefully we will see a second edition within ten, not 21 years.

Reference

Serena M (Ed) (1995) *Reintroduction Biology of Australian and New Zealand Fauna*. (Surrey Beatty & Sons: Chipping Norton, New South Wales)

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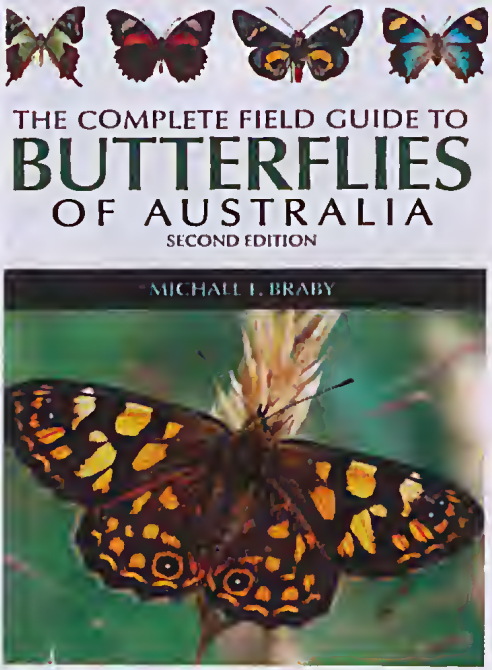
The complete field guide to butterflies of Australia

by Michael F Braby

Publisher: CSIRO Publishing, Clayton South, 2016. 2nd edition. 384 pages, softback. ISBN 9781486301003. RRP $49.95

The first edition of this field guide, published in 2004, was rightly lauded as a major and accessible contribution to advancing study of Australia's butterflies, and has become part of the standard 'armoury' of field naturalists. Since then, as Michael Braby points out in his preface to this new edition, some 700 further publications (including eight books) have increased knowledge of our butterfly fauna further—in no small part flowing from the stimulus provided by the 2004 Guide. Perceptive taxonomic studies and increased field surveys have increased our fauna to 435 species, including those from the more distant islands of Australia.

This updated book is therefore very welcome, in bringing together all information available until the end of 2014. In general the format closely resembles that of the first edition, but with additional text and illustrations to incorporate those additional taxa: 106 new colour illustrations of butterflies augment or replace those used earlier, and the general high production quality of the first edition has been sustained. The diversity of the fauna is now, with numbers of species from the first edition given in parentheses, Papilionidae 21 species (18); Hesperiidae 125 (121); Pieridae 40 (35), Nymphalidae 94 (81), Riodinidae 1 (1), and Lycaenidae 154 (142). Additions have thus occurred in all five main families. A few are genuine new arrivals to Australia—the spread of the Tawny Coster *Acraea terpsocore* since it became established near Darwin in 2012 is especially notable—whilst some other additions represent new resident discoveries or taxonomic reappraisals of endemic complexes of closely related taxa. The sequence of family treatments within the text has been changed to reflect more recent work on butterfly phylogeny, and this is reflected also in the revised checklist of taxa, in which a number of higher category names differ from those used earlier.



The volume is some 40 pages longer than the first edition, and includes a new chapter on butterfly collecting and specimen preparation. This will be welcomed by hobbyists and students alike, as will the enlarged reference list and summary of local sources of information that concludes the book, and the indices to common and scientific names. However, and in accordance with the book's role as an identification manual for adult butterflies, information on rearing butterflies is not included. The general introductory text has been augmented and updated. For example, the biogeographic regions of Australia differ markedly from those used earlier, and the new map (p. 10) presents these revised divisions, which may be unfamiliar to many readers.

The bulk of the book (pp. 52-341) is a synoptic account of all species, with common names preceding scientific names for each. Two or three species are treated by text on each left-hand page and faced by excellent corresponding colour photographs of the set butterflies, both in upperside and underside views, and sexual dimorphism illustrated. The text includes distribution maps of each taxon, and a summary of flight periods, all of which have been revised as necessary to accommodate new distribution records or taxonomic changes. As examples, the Northern Territory distribution of the Bright-orange Darter *Telicota augias* and the Narrow-brand Darter *T. mesoptis* on Cape York have both increased markedly, and the elevation of the Pale Imperial Hairstreak *Jalmenus eubulus* to a full species from its earlier ranking as subspecies of the Imperial Hairstreak *J. evagoras* has necessitated new maps. The brief text paragraphs are informative, with summaries of biology, major habitats, distinction from similar species, adult behaviour, listings of larval food plants and conservation status. The status comments for several of the Alpine Xenicas *Oreixenica* spp. (one of which adorns the front cover of the book) have been changed from terms such as 'common and widespread' to 'superabundant and widespread'—and one hopes that similar comments will still apply in later editions, as their alpine and subalpine habitats succumb progressively to development and climate change.

This useful and attractive book retains and enhances the values of the first edition as an indispensable guide to Australia's butterflies, and will be of lasting value to all interested in our remarkable insect fauna.

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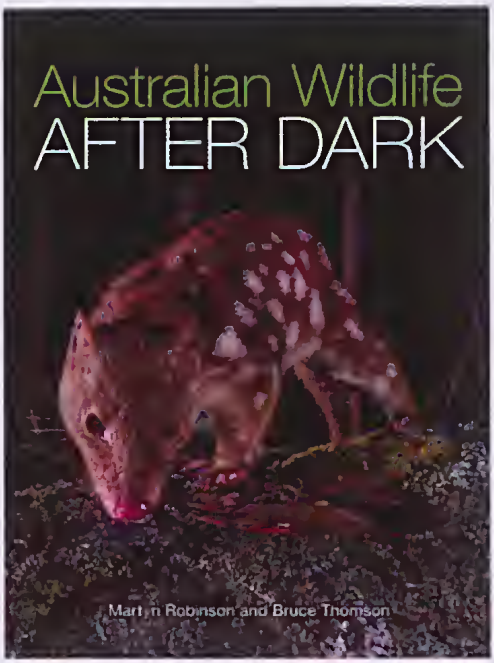
Australian Wildlife After Dark

by Martyn Robinson and Bruce Thomson

Publisher: *CSIRO Publishing, Melbourne, 2016.*
vii + 160 pages, Paperback. ISBN 9781486300723, RRP $35.00

If you flick through the pages of this book you will see very good photographs of animals which are active mainly at dusk or through the night rather than during the day: marsupials, bats, rodents, frogs, egg-laying turtles, and some birds, reptiles and invertebrates. The driving factors which work towards a nocturnal life are avoidance of heat in Australia's hot, dry climate and escape from predators. However, there is also a guild of predators which has evolved to exploit nocturnal prey. In the author's own words 'The book is not designed as a field guide, but more of a 'lifestyle options' guide to the nocturnal Australian fauna, and how and why they do what they do.' The publisher introduces the producers of this book by 'Each example is described in a unique, friendly way by Martyn Robinson, familiar to many Australians by his frequent media appearances ... and Bruce Thomson, an internationally renowned wildlife photographer and bat researcher.'

The chapter 'Evening and dawn' gives short biographies of a few examples of marsupials, particularly macropods, which are the first to emerge after the heat of the day, or lizards, which return to a more benign habitat before daylight. Then follows 'The night shift' where the theme is vision and adaptations which enhance it: a preponderance of rod receptors which have far greater sensitivity in low light; the *tapedum lucidum*, behind the retina, which



reflects light back into the eye; and some animals have relatively larger eyes. Here you will meet possums and gliders, flying foxes, geckoes, crocodiles, moths and wolf spiders.

'When vision fails, there's always sound' immediately brings to mind insectivorous bats that hunt using ultrasound echolocation, and owls with their acute, binaural hearing allowing some to hear and locate prey in absolute darkness. But there is more to life than eating. Katydids and frogs, to mention but two examples, call to attract mates. A chapter entitled 'Then there is smell' has two aspects. Firstly here is the enhanced olfactory sense which allows bandicoots to locate beetle grubs by smell. However, the potoroo's ability to locate underground fungi in the same way is not mentioned. The feathery antennae of male moths, adapted for the detection of female pheromones, is not mentioned either. Secondly, many night blooms are pale and strongly scented, attributes which will attract pollinators, and the odour of ripening fruit brings frugivorous species necessary to ensure dispersal.

Another sense is discussed in the chapter 'And touch'. The long, sensitive whiskers of rodents, especially useful for navigating in confined spaces, are the prime example. Orb weaver spiders detect vibrations in their web with sensitive hairs on their legs announcing that a meal has arrived. Finally, the electroreceptors in the bill of the platypus and the heat sensitive pits on the face of pythons finish the inventory of adaptations of life in the dark.

There is much more information about each of the animal life histories than their adaptation to a night life and the behaviour that stems from that. The authors particularly discuss various aspects of reproductive biology and major predators. That is not a bad thing as there is valuable and often little known knowledge encapsulated therein.

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Thank you from the Editors

The Victorian Naturalist could not be published, and would not be successful, without the tremendous effort given voluntarily by a large number of people who work behind the scenes.

As always, we particularly thank our authors, who provide us with excellent material for publication.

One of the most important editorial tasks is to have papers refereed. The Editors would like to say 'thank you', therefore, to the following people who refereed manuscripts that were published during 2016:

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and our printers, Focus Print Group, especially Stuart Anderson.

Guidelines for Authors – *The Victorian Naturalist*

December 2016

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Submission of a manuscript will be taken to mean that the material has not been published, nor is being considered for publication, elsewhere, and that all authors agree to its submission.

Authors may submit material in the form of Research Reports, Contributions, Naturalist Notes, Letters to the Editor and Book Reviews. All Research Reports and Contributions are peer reviewed by external referees. A ***Research Report*** is a succinct and original scientific paper written in a form that includes an abstract, introduction, methods, results and discussion. Research Reports should be written in third person. A ***Contribution*** may consist of reports, comments, observations, survey results, bibliographies or other material relating to natural history. The scope of a contribution is broad in order to encourage material on a wide range of topics and in a range of styles. This allows inclusion of material that makes a contribution to our knowledge of natural history but for which the traditional format of scientific papers is not appropriate. ***Naturalist Notes*** are generally short, personal accounts of observations made in the field by anyone with an interest in natural history. These notes also may include reports on excursions and talks, where appropriate, or comment on matters relating to natural history. ***Letters to the Editor*** must be no longer than 500 words. ***Book Reviews*** are usually commissioned, but the editors also welcome enquiries from potential reviewers.

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Lunney D (1995) Bush Rat. In *The Mammals of Australia*, pp. 651-653. Ed R Strahan. (Australian Museum/Reed New Holland: Sydney)

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Wolf L and Chippendale GM (1981) The natural distribution of *Eucalyptus* in Australia. Australian National Parks and Wildlife Service, Special Publications No 6, Canberra.

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Mammals – Menkhorst PW and Knight F (2011) *A Field Guide to the Mammals of Australia*. 3rd edn. (Oxford University Press: South Melbourne)

Reptiles and Amphibians – Cogger H (2014) *Reptiles and Amphibians of Australia*. 7th edn. (CSIRO: Collingwood, Victoria)

Insects and Marine Creatures – ABRS: <http://www.environment.gov.au/biodiversity/abrs/online-resources/fauna/index.html>

Birds – Christidis L and Boles WE (2008) *Systematics and taxonomy of Australian birds*. (CSIRO: Collingwood, Victoria)

Plants – VicFlora (2015). Flora of Victoria, Royal Botanic Gardens Melbourne, <http://data.rbg.vic.gov.au/vicflora>, last accessed (insert relevant date).

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